

**ORITROPHIUM ORIZABENSE (ASTERACEAE: ASTEREA), A NEW SPECIES AND THE FIRST REPORT OF THE GENUS FROM NORTH AMERICA**

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ABSTRACT

*Oritrophium orizabense* is described from the northeastern slopes of Pico de Orizaba in Veracruz, México, where it was collected from a vertical rock wall. It is the first report from North or Central America of a genus largely restricted to the Andes of South America, with most of the species in Venezuela and Colombia. The new species apparently is most closely similar to several Venezuelan endemics, including *O. nevadense*, *O. blepharophyllum*, and *O. figueirasii*. The closest relatives of *Oritrophium* lie with other New World genera rather than with Australian *Celmisia*, as has been previously postulated. *Celmisia* is instead a member of a natural group of genera endemic to Australia and New Zealand.

KEY WORDS: *Oritrophium*, *Celmisia*, Asteraceae, Astereae, México

The species described here is the first representative of *Oritrophium* (Kunth) Cuatr. known outside of South America. Most of the other species are endemic to high elevation habitats primarily of Venezuela, Colombia, Ecuador, Perú, and Bolivia; *O. vahlii* (Gaud.) Cuatr. is primarily Argentinian and ranges as far south and west as Tierra del Fuego and Islas Malvinas. This group of species was first recognized within *Aster* L. as sect. *Oritrophium* Kunth, later as *Erigeron* L. sect. *Oritrophium* (Kunth) Benth. & Hook. Much later and nearly concurrently, they were considered to be a separate genus by Cuatrecasas (1961) but transferred to the genus *Celmisia* Cass. (Solbrig 1962). Most of the approximately 15-20 species of *Oritrophium* have been placed there by Cuatrecasas, either by nomenclatural transfers in his original paper or as descriptions of new species in his subsequent studies of Andean Astereae. The genus, however, has never received a taxonomic summary, aside from two floristic treatments (Aristeguieta 1964; Cuatrecasas 1969). The relationship between *Oritrophium* and *Celmisia*, a genus otherwise restricted to

New Zealand, Tasmania, and Australia, was evaluated by Solbrig (1962), who concluded that only a single genus was represented. Subsequent to Solbrig's study, however, all American species have been placed in *Oritrophium*.

Plants of *Oritrophium* are distinctive in their perennial, herbaceous habit, basal rosettes of leaves arising from a short, thick rhizome, long, thin, white hairs commonly produced by the lower petioles, monocephalous stems, non-carinate phyllaries, pistillate (ray) flowers with showy, white ligules, and functionally staminate (disc) flowers with sterile ovaries (the linear style branches with a corresponding lack of stigmatic lines). Cuatrecasas (1961) suggested that *Oritrophium* might be related to the South American genus *Diplostephium* Kunth "y a las Baccharidineae" on the basis of their similarity in sterile disc ovaries. In the "clave diagnóstica" of a more recent paper, Cuatrecasas (1986) again treated *Oritrophium* and *Diplostephium* as a pair. *Diplostephium*, however, is shrubby, not dioecious, and produces coriaceous leaves with strongly revolute margins, and it is probably more closely related to other South American genera with similar habit and morphology (e.g., *Chiliotrichum* Cass.) than to *Oritrophium* or any genera of the Baccharidineae.

*Oritrophium* appears to be somewhat isolated among its South American relatives in the Astereae, and it may be more similar to some groups of American *Aster* L. (Nesom, in prep.) in its rhizomatous perennation, vestiture (suppressed Type A trichomes), more or less tubular disc corollas (not goblet shaped), linear disc style appendages, and ray corollas with long, white ligules. The South American genus *Noticastrum* DC. has similarly been hypothesized to belong to a group of genera (the "goldenasters") occurring primarily in North and Central America (Nesom 1991).

*Celmisia* is similar to *Oritrophium* in habit as well as general morphological details. The disc flowers of *Celmisia*, however, differ in their fertile ovaries and extremely high chromosome numbers (12-ploid and 24-ploid, see below). This suggests that the South American elements referred to *Celmisia* are part of a clade separate from the New Zealand species. Most closely related to *Celmisia* sensu stricto (ca. 60 species) are species of four genera restricted to Australia, Tasmania, and New Zealand: *Olearia* Moench sensu lato (ca. 100 species), *Pleurophyllum* J.D. Hook. (2-3 species), *Pachystegia* Cheeseman (1 species), and *Damnamenia* Given (1 species). A similarity between *Celmisia* and *Pleurophyllum* has long been noted (Bentham & Hooker 1873; Allan 1961). Given (1973) included all of these genera except *Pachystegia* in his phenetic arrangement of generic level groups. *Olearia* has been hypothesized to be polyphyletic (Drury 1968; Given 1973), with some of the species more related to *Pleurophyllum*, some to *Celmisia*; other species apparently are outside of the *Celmisia* alliance. Given (1969) acknowledged the taxonomic relationship (sensu Solbrig) between *Oritrophium* and *Celmisia* but excluded the former from consideration in his investigations without further comment. The otherwise tacit exclusion of *Oritrophium* as a relative of the *Celmisia* alliance

probably reflects the distant geographic separation of the two groups.

Meiotic chromosome numbers of two species of *Oritrophium* have been reported: *O. hirtopilosum* (Hieron.) Cuatr. is tetraploid ( $n=18$  pairs, Dillon & Turner 1982), and *O. aciculifolium* Cuatr. is diploid ( $n=9$  pairs, Turner *et al.* 1967). Chromosome counts for 65 species of *Celmisia* *sensu stricto*, including representatives from all of the infrageneric categories proposed by Given (1969) are all 12-ploid or 24-ploid ( $n=54$  or 108; Hair 1980), assuming that the base number is  $x=9$ . This high ploidy level is a highly specialized cytological feature within the Astereae. *Damnomenia* is 12-ploid (Hair 1980); *Pachystegia* is 12-ploid (Hair *et al.* 1967); species of *Olearia* are 12-ploid, 24-ploid, 32-ploid, 36-ploid, 48-ploid, and a few are diploid (approximately 20 species counted, many by Beuzenberg & Hair 1984). The chromosome number for *Pleurophyllum* Hook. apparently has not been determined, but the genus clearly belongs to the *Celmisia* alliance. All other Australasian genera of Astereae for which a count is available, including *Vittadinia* A. Rich., *Minuria* DC., *Tetramalopium* Nees, *Remya* Benth. (postulated by Wagner & Herbst 1987 to be closely related to *Olearia*), and others, are diploid or tetraploid ( $n=9$  or  $n=18$ ).

Based on these observations, it is a reasonably well supported hypothesis that the closest relatives of *Celmisia* are those morphologically and cytologically similar genera from the same geographic area (Australia and New Zealand). The herbaceous, scapose habit in *Celmisia* probably has been derived independently of that in *Oritrophium*, as many of the closest relatives of *Celmisia* are shrubs with multiheaded capitulescences. Further, some species of *Celmisia* are more like shrubs than rosette forming herbs, with leaves evenly distributed along erect, woody stems (Given 1969). The closest relatives of the new species described below are within South American *Oritrophium*.

*Oritrophium orizabense* Nesom, *sp. nov.* (Fig. 1) TYPE: MEXICO. Veracruz: Mpio. Calcahualco, El Desbarrancadero a unos 3 km del Ejido Jacal, [ca. 97° 12' W, 19° 04' N]; pared vertical rocosa, suelo andosol, 3220 m, 12 Mar 1992, C. Avila B. 112 (HOLOTYPE: TEX!; Isotype: CHAPA).

A *Oritrophio nevadensi* (Wedd.) Cuatr. differt foliis marginibus glabris, bracteis caulibus paucioribus minoribus integrisque, et capitulis minoribus flosculis radii ac disci paucioribus.

Perennial herbs, arising from a thickened (7-15 mm wide), short (2-6 cm long), vertical to horizontal, fibrous-rooted rhizome, the rhizomes sometimes with thin interconnectives among adjacent plants. Stems 1-(several) from each root crown, unbranched, erect, 3-7 cm tall, lightly but persistently woolly with



Figure 1. Habit of *Oritrophium orizabense* (from holotype).

unicellular (Type B; Nesom 1976) trichomes, eglandular, essentially scapose, the upper half with 3 or 4 linear-lanceolate bracts 4-6 mm long. Leaves all in a basal rosette, spreading, oblanceolate, 15-40 mm long, 3-7 mm wide, the margins (distal half) shallowly serrate with (2-)4-8 pairs of blunt teeth, only the midvein visible, the lower petiole margins producing a copious amount of persistent, long, silvery silken hairs (Type B trichomes) that appear to protrude from the root crown, the blades glabrous or sometimes with a few, barely persistent wisps of hair. Heads broadly turbinate, 9-12 mm wide; phyllaries in 2-3 graduated series, oblong-lanceolate, thin herbaceous and without apparent venation, slightly convex but not at all carinate, all 1.0-1.2 mm wide, the innermost 5-8 mm long with acute apices, the outermost ca. half as long with rounded apices, strongly purplish at least on the distal portions, the distal margins somewhat fringed ciliate; receptacles flat, epaleate. Ray flowers 21-37 in a single series, the corollas 12-14 mm long, the ligules 7-10 mm long, white, ca. 1.0-1.5 mm wide, apically coiling, densely invested with long, unicellular, viscid hairs around the tube-ligule junction. Disc flowers with regular corollas 5-6 mm long, narrowly funnelform, with triangular lobes equal in length, 0.8-1.0 mm long and apparently erect, with numerous, biseriate, glandular viscid trichomes (Type C), the tube with druse ("sand") crystals, without crystal in the throat; style branches linear-lanceolate, 1.3-1.5 mm long, densely long papillate, without stigmatic lines; anther thecae with slight basal extensions, the apical appendages linear-oblong, 0.2-0.3 mm long; ray achenes fertile, 5 veined, densely sericeous, eglandular, mature shape and size not seen; carpodium strongly elaborated into an asymmetric column 8-10 cells high; pappus simple, of 40-45 slender, barbellate bristles ca. 5 mm long, without a differentiated outer series; disc achenes with sterile ovaries, 4-5 veined, linear, sparsely strigose; pappus of 16-18 bristles inserted on a thickened rim. Known only from the type collection.

Although the position of *Oritrophium orizabense* within the genus is speculative, it appears to be most similar to several species restricted to Venezuela. *Oritrophium nevadense* (Wedd.) Cuatr. (illustrated in Aristeguieta 1964) produces more or less oblanceolate leaves without basal flanges and with margins serrulate from at least the middle to the apex, scapose (or scapiform) and eglandular stems, relatively broad (vs. linear) phyllaries, and pubescent achenes. In contrast to the new species, the leaves of *O. nevadense* have pilose ciliate margins, a greater number of cauline bracts, which are larger and toothed, and much larger heads with more ray and disc flowers. *Oritrophium figueirasii* Cuatr. and *O. blepharophyllum* (S.F. Blake) Cuatr. also are similar to the new species in their relatively small stature, merely bracteate stems, and serrulate leaves, but both produce stipitate-glandular leaves and stems.

*Oritrophium orizabense* might be confused with scapose species of *Erigeron* (although there is none in México that is similar). The new species, however, as well as all of *Oritrophium*, differs from *Erigeron* (New World species) in

the elaborated Type B trichomes (Type A trichomes absent; see Nesom 1976), phyllary veins very thin and without associated, conspicuous resin ducts, sterile disc ovaries, linear style branches, relatively long apical appendages of the anther thecae, the fertile achenes fusiform, 5 veined, with an elaborated, asymmetric carpodium, and the simple pappus, lacking a shorter "outer" series.

#### ACKNOWLEDGMENTS

I thank Billie Turner and Robert Jansen for their review of the manuscript and especially John Pruski for his detailed comments and help in providing literature and information on specimens at NY.

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